

transverse fashion, and further comprising an elastic clip situated in an opening formed by the hole.

18. (New) The connecting piece according to claim 10, wherein the body has at least one clamp-type projection for arresting a wiper arm end.

REMARKS

This Preliminary Amendment cancels without prejudice claims 1-9 in the underlying PCT Application No. PCT/DE00/02637, and adds new claims 10-18. The new claims conform the claims to U.S. Patent and Trademark Office rules and do not add new matter to the application.

In accordance with 37 C.F.R. § 1.121(b)(3), the Substitute Specification (including the Abstract, but without the claims) contains no new matter. The amendments reflected in the Substitute Specification (including Abstract) are to conform the Specification and Abstract to U.S. Patent and Trademark Office rules or to correct informalities. As required by 37 C.F.R. § 1.121(b)(3)(iii) and § 1.125(b)(2), a Marked Up Version Of The Substitute Specification comparing the Specification of record and the Substitute Specification also accompanies this Preliminary Amendment. Approval and entry of the Substitute Specification (including Abstract) is respectfully requested.

The underlying PCT Application No. PCT/DE00/02637 includes an International Search Report, dated December 27, 2000. The Search Report includes a list of documents that were uncovered in the underlying PCT Application. A copy of the Search Report accompanies this Preliminary Amendment.

Applicant asserts that the present invention is new, non-obvious, and useful. Prompt consideration and allowance of the claims are respectfully requested.

Respectfully Submitted,

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CONNECTING PIECE FOR CONNECTING A WIPER BLADE WITH A WIPER ARM

Background Information

[The invention is based on a connecting piece for connecting a wiper blade and a wiper arm according to the preamble of main claim 1.

5]Connecting pieces for connecting the wiper arm with the wiper blade are already known, for example from European Patent No. 0 863 058 [A2]; however, the connecting piece presented there has a multipart construction, so that different adapter parts are used, partly according to the modular design system, for different wiper arms.

10 [Advantages of the] Summary Of The Invention

[In contrast, the] The connecting piece according to the present invention [having the characterizing features of the main claim] has the advantage that it can receive (accept) a multiplicity of standard types of wiper arm ends, and thus can also be used with a multiplicity of differently dimensioned wiper arms. In addition, it can be
 15 manufactured in one piece, for example, in an injection molding method, which results in [an essential] a significant advantage during installation (assembly), because it is not necessary first to determine which adapter piece fits the wiper arm end in question. This is especially important in particular because, as a rule, the installation is carried out by the vehicle driver himself, i.e., by a layman, not an
 20 expert.

[Advantageous developments and improvements of the connecting piece indicated in the main claim result from the measures indicated in the subclaims.]

25 Due to the fact that the wiper arm end is constructed in the shape of a fork, there results a high degree of rigidity of the connection between wiper arm and wiper blade. In this way, the optimal angle between windshield and wiper blade can be

MARKED-UP VERSION OF SUBSTITUTE SPECIFICATION

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precisely maintained.

A fitting adapter piece having a fork-shaped construction can also connect the connecting piece with a strip-shaped wiper arm end, as is standard for some wiper arms, without loss of rigidity.

If a region of the connecting piece is constructed as a flexible plateau, an especially high dimensional tolerance is achieved. If the flexibility of the plateau is due to crosspieces that have an angle to the wiper arm of less than 90° , then when the connecting piece is removed from the wiper arm there results a self-arresting effect that further increases the strength of the connection between wiper arm and wiper blade.

Due to the fact that the flexible regions have stops for limiting the flexibility, a high degree of resistance to breaking is also ensured.

Through the clamp-type projections for arresting the wiper arms, a multiplicity of different wiper arms can be fastened securely to the wiper blade, since it is not necessary to use the arresting method used by the manufacturer of the wiper arm.

Brief Description Of The Drawings

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In the following, the present invention is explained on the basis of an exemplary embodiment with associated drawings.

]Figure 1 shows a schematic view of a part of a wiper apparatus having the inventive connecting piece, in the installed position[.].

Figure 2 shows a box region of a center bracket of a wiper blade[.].

Figure 3 shows a hook-shaped wiper arm end[.].

Figure 4 shows a connecting piece according to the present invention and a pin-arm wiper arm end, in a perspective view[.].

Figures 5 and 6 show a connecting piece according to the present invention, each having a hook-shaped wiper arm end[.].

Figure 7 shows a connecting piece according to the present invention having a strip-type wiper arm end and a fork-shaped adapter, in a perspective view[.].

Figure 8 shows a section through an inventive connecting piece[, and].

Figure 9 shows a section through an adapter.

Detailed Description [of the Exemplary Embodiment]

In Figure 1, a connecting piece 10 having a wiper arm 11 and a wiper blade 12 can be seen. In the installed position, the wiper blade lies on a windshield 13. Wiper arm 11 has two ends, its lower end being connected with a wiper motor 14. Its upper end standardly has either a hook-type wiper arm end (11a), a pin-type wiper arm end (11b), or a strip-type wiper arm end (11c).

In Figure 2, a box region 15 of a center bracket of a wiper blade 12 is shown. In this region there is located a connecting element 18, often a rivet or a roll rivet, that connects the body of connecting piece 10 with wiper blade 12. At the sides, box region 15 has various bored holes 21 that may have a border.

Figure 3 shows a hook-shaped wiper arm end. It has a hook-shaped 180° bend having radius R.

Figure 4 shows an inventive connecting piece 10 and a pin-type wiper arm end 11b. Pin-type wiper arm end 11b has a pin 24 that in the installed position lies parallel to

the windshield and perpendicular to wiper arm 11, and whose diameter is diminished in a suitable segment.

5 The body of connecting piece 10 essentially has two side walls 30 that are held by three cross-connecting pieces 27a, 27b, and 27c, and that receive and support wiper blade 12 (see also Figure 8).

10 On the front side, facing away from wiper arm 11, of the connecting piece, side walls 30 extend beyond cross-connecting pieces 27a, b, c, and are terminated by raised parts 33. This results in a clamp-type projection 31 that is used to arrest hook-type wiper arm ends 11a.

15 Upper surface 27a is curved downward in the front region of the body, forming a radius 36.

On its lower side, which in the installed state faces the windshield, the connecting piece has a transverse groove 37 that tapers upward and that terminates with a cylindrical opening 38 that receives connecting element 18 of wiper blade 12.

20 In the rear region, facing the wiper arm, connection piece 10 has, on its side facing windshield 13, slots 40 in lateral walls 30, so that lower surface 27b is supported only by thin crosspieces 39, and thus forms a flexible plateau.

25 The direction of slots 40, and thus the direction of crosspieces 39, is usefully selected such that when connecting piece 10 is removed from wiper arm 11a, the adhesion of wiper arm 11a to lower surface 27c effects an increase of the contact pressure of lower surface 27c on wiper arm 11a.

30 This is achieved in that when connecting piece 10 is withdrawn from wiper arm 11a, the lowest surface 27c is moved slightly forward through its adhesion to wiper arm

11a. The angle of crosspieces 39 to the wiper arm, and thus the distance between upper surface 27a and lower surface 27c, is increased slightly by this, increasing the contact pressure of surface 27c against the bent over end of wiper arm 11a.

- 5 In order to limit flexibility, flexible region 41 has stops 44 that prevent crosspieces 39 from breaking off.

Above plateau 27c, connecting piece 10 has a hole 43 that extends through it transversely between the upper surface and the center surface. This hole 43

- 10 receives a pin-arm wiper arm 11b.

For this purpose, center surface 27b is interrupted by a tongue-type clip 45 that extends from transverse groove 37 to behind hole 43, and that reduces the diameter of hole 43 inside the body of connecting piece 10. Clip 45 is bent upward behind

15 hole 43, and subsequently has a pressure surface 48 that runs in parallel alignment to upper surface 27a.

- If pin 24 of a pin-type wiper arm end 11b is now introduced into opening 43, clip 45 is first bent downward so that it will then snap upward, due to the diminished
- 20 diameter, when pin 24 is located in the desired position, thus snapping wiper arm 11 into place.

On the upper surface, the connecting piece has two openings 52 that can be used to fasten an adapter 55.

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In Figure 5, a connecting piece 10 having a hook-type wiper arm end 11a is shown in the installed position.

- Figure 6 likewise shows a connecting piece 10 according to the present invention
- 30 having a wiper arm 11a, but here wiper arm 11a has a larger radius R than in Figure

5. For this reason, the bent-off end slides under flexible plateau 27c, and presses this plateau slightly upward if necessary. Here the arresting via raised parts 33 of connecting piece 10 can be seen clearly.

5 Figure 7 shows a connecting piece 10 according to the present invention together with an adapter 55 and a strip-type wiper arm end 11c. Adapter 55 essentially has a long and a short longitudinal brace 58, 59, connected with one another by a transverse brace 62 in such a way that a fork-type structure results.

10 Figure 9 shows adapter part 55 in a sectional view. The long upper longitudinal brace 58 has on its lower side, in the front region facing connecting piece 10, an arresting tongue 65, to whose end teeth 68 are attached that arrest adapter 55 in openings 52 of connecting piece 10. On the side of adapter 55 facing wiper arm 11, there is located an arm receptacle 71 made up of an opening and an arrest hole 74.
15 Arm receptacle 71 is fashioned in such a way that a strip-shaped wiper arm 11c can be inserted and is arrested via a wiper arm peg 77 (tab) that snaps into arrest hole 74.

In the connection of adapter 55 with connecting piece 10, short longitudinal brace 59
20 is inserted into the area between center and lower surfaces 27b and c. Long longitudinal brace 58, having arrest tongue 65, of adapter 55 slides forward on upper surface 27a of connecting piece 10. In the snapped-in state, teeth 68 engage in openings 52.

25 It is also possible to attach an arrest pin to the lower side of short longitudinal brace 59; in the snapped-in state this bolt snaps into a hole located in the flexible plateau, i.e., surface 27c.

Abstract Of The Disclosure

A connecting [Connecting] piece [10] for connecting a wiper arm [11] with a wiper blade, having three different fastening systems for wiper arms [11], so that a multiplicity of wiper arms [11] can be received.

[(Fig. 7)]
